

## ANNUAL EXPERIMENTAL EVALUATION REPORT

### Cold In-Place Recycle (CIR) Koch™ Process CIR-EE

Location: Red Lodge, Montana – Carbon County, Highway 212 (P-28) Milepost 91-101.6

Project No.: Red Lodge North STPP 28-2(22)70

FHWA No. MT 00-03

Description: Experimental rehabilitation project consisting of cold milling approximately 75mm of asphalt cement, replace with cold in-place recycled using Koch's CIR-EE (Cold in-place Engineered Emulsion), plant mix surfacing and seal & cover

Evaluation Date: November 2004

Date Constructed: July 2001

Report Origin: Craig Abernathy  
Experimental Project Manager

Highway 212, (P-28) suffered from rutting, plastic deformation and transverse cracking with the previous AC pavement. The Montana Department of Transportation, Billings Division decided to conduct an experimental cold in-place recycle project using Koch Pavement Solutions™ CIR-EE process. The length of the project allowed the installation of various treatments with adequate control sections. Research will perform and publish annual project evaluations until the year 2006. A final report will be issued at that time. Research may elect to continue the evaluations informally after this time. This report is the third year analysis.

### Analysis

The experimental documentation will encompass recording visual distress, wheel rut measurements and crack mapping with 300 ft. intervals at every data location of the project. There are three data locations at each section for a total of eighteen sites. The breakouts of sections within this project are as follows (locations are approximate):

- ▶ **Section 1:** MP 89- MP 91, 90mm cold mill, 105mm PMS
- ▶ **Section 2:** MP 91-MP 94.3, 75mm recycle with 45mm PMS overlay
- ▶ **Section 3:** MP 94.3-MP 95.4, 75mm recycle with seal and cover
- ▶ **Section 4:** MP 95.4-MP 96.3, 75mm mill and fill PMS
- ▶ **Section 5:** MP 96.3-MP 98, 75mm recycle with seal and cover
- ▶ **Section 6:** MP 98-MP 101.6, 75mm recycle with two lifts of PMS (90mm)

The following is the individual breakout on cracks-per-mile (CPM) in order as listed above.

<u>Treatment</u>	<u>CPM</u>
Section 1	0
Section 2	0
Section 3	23
Section 4	35
<b>*Section 5</b>	<b>68</b>
Section 6	0

\*This data site was located in section 5, milepost 97.5 at the 75mm recycle site. The extrapolation puts the CPM at 68, with a standard deviation of 2.0. This report will note that initially with the first annual inspection there was an abnormally high transverse cracking within the 300' data site. To date, four, low severity across-lane cracks and one partial lane crack were documented. The other two data sites within this section are just beginning to exhibit across-lane cracking. In earlier analysis it was speculated data site 97.5 was anomalous with cracking compared to the entire section. The new cracking within the section data sites may be an indicator of performance.

To date sections 1, 2, and 6 have no noticeable cracking. Sections 3 & 4 are beginning to show progressive transverse cracking, all low severity in nature. At this time the extent of transverse cracking in all sections is minimum and rated as good to fair.

The chart below is the averaged wheel-path rutting for all treatments. Rutting data was measured by the string-line method. All values are rounded to the nearest whole number.

TREATMENTS	AVERAGE RUT DATA (IN MILLIMETERS)			
	NORTHBOUND		SOUTHBOUND	
	OWP	IWP	IWP	OWP
(1) 90mm cold mill, 105mm PMS	4	3	4	4
(2) 75mm recycle, 45mm PMS	4	1	1	2
(3) 75mm Recycle	3	5	7	5
(4) 75mm mill and fill PMS	6	4	3	4
(5) 75mm recycle	3	3	8	5
(6) 75mm recycle, 90mm PMS	6	3	2	4

Most data sites exhibited good appearance and even seal with minimum rut. Several sections did have minimum flushing mainly in the wheelpaths. Section 2 (75mm recycle, 45mm PMS) displayed the best performance in rutting. Both 75mm recycle sections (3 & 5) exhibited the most in averaged increased rut. On average rutting is minor on the entire project.

Based on this evaluation Research has rated this project as performing well. The following are images of the individual treatments. All views are looking north. This report and additional project information can be found at the following address: <http://www.mdt.state.mt.us/research/projects/redlodge.shtml>

**Section 1: MP 89- MP 91, 90mm cold mill, 105mm PMS**

Data sites 1, 2, & 3



**Section 2:** MP 91-MP 94.3, 75mm recycle with 45mm PMS overlay

Data sites 4, 5, & 6



**Section 3: MP 94.3-MP 95.4, 75mm recycle with seal and cover**

Data sites 7, 8, & 9



**Section 4: MP 95.4-MP 96.3, 75mm mill and fill PMS**

Data sites 10, 11, & 12



**Section 5: MP 96.3-MP 98, 75mm recycle with seal and cover**

Data sites 14, & 15. Image for site 13 is unavailable.



**Section 6: MP 98-MP 101.6, 75mm recycle with two lifts of PMS (90mm)**

Data sites 16, 17 & 18.

